

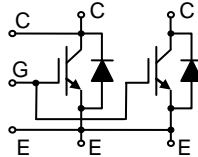
# MBN600E45A

Silicon N-channel IGBT

## FEATURES

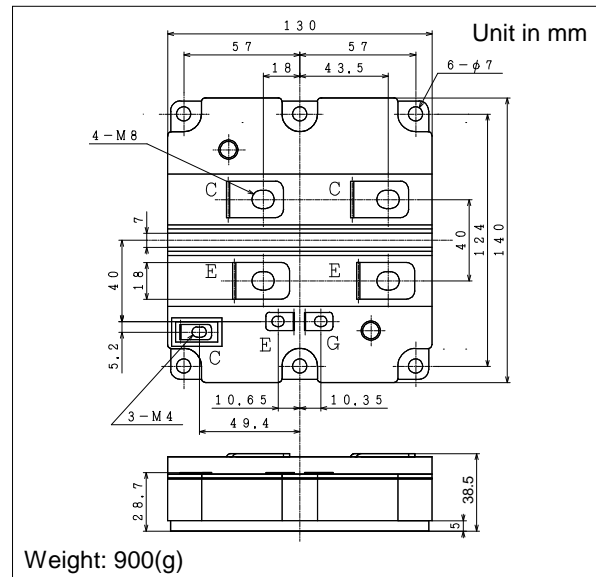
- \* High speed, low loss IGBT module.
- \* Low driving power due to low input capacitance MOS gate.
- \* Low noise due to ultra soft fast recovery diode.
- \* High reliability, high durability module.
- \* High thermal fatigue durability.  
( $\Delta T_c=70^\circ\text{C}$ ,  $N>30,000$ cycles)
- \* Isolated heat sink (terminal to base).

## CIRCUIT DIAGRAM



TERMINALS

## OUTLINE DRAWING



## ABSOLUTE MAXIMUM RATINGS ( $T_c=25^\circ\text{C}$ )

Item	Symbol	Unit	MBN600E45A
Collector Emitter Voltage	$V_{CES}$	V	4,500
Gate Emitter Voltage	$V_{GES}$	V	$\pm 20$
Collector Current	DC	$I_C$	600
	1ms	$I_{Cp}$	1,200
Forward Current	DC	$I_F$	600
	1ms	$I_{FM}$	1,200
Junction Temperature	$T_j$	$^\circ\text{C}$	-40 ~ +125
Storage Temperature	$T_{stg}$	$^\circ\text{C}$	-40 ~ +125
Isolation Voltage	$V_{ISO}$	$V_{RMS}$	6,000(AC 1 minute)
Screw Torque	Terminals (M4/M8)	-	2/10 (1)
	Mounting (M6)	-	6 (2)

Notes: (1) Recommended Value  $1.8\pm 0.2/9\pm 1\text{N}\cdot\text{m}$ (2) Recommended Value  $5.5\pm 0.5\text{N}\cdot\text{m}$ 

## ELECTRICAL CHARACTERISTICS

Item	Symbol	Unit	Min.	Typ.	Max.	Test Conditions	
Collector Emitter Cut-Off Current	$I_{CES}$	mA	-	-	12	$V_{CE}=4,500\text{V}$ , $V_{GE}=0\text{V}$ , $T_j=25^\circ\text{C}$	
			-	34	67	$V_{CE}=4,500\text{V}$ , $V_{GE}=0\text{V}$ , $T_j=125^\circ\text{C}$	
Gate Emitter Leakage Current	$I_{GES}$	nA	-500	-	+500	$V_{GE}=\pm 20\text{V}$ , $V_{CE}=0\text{V}$ , $T_j=25^\circ\text{C}$	
Collector Emitter Saturation Voltage	$V_{CE(sat)}$	V	4.5	5.5	6.3	$I_C=600\text{A}$ , $V_{GE}=15\text{V}$ , $T_j=125^\circ\text{C}$	
Gate Emitter Threshold Voltage	$V_{GE(TO)}$	V	4.5	6.0	7.5	$V_{CE}=10\text{V}$ , $I_C=600\text{mA}$ , $T_j=25^\circ\text{C}$	
Input Capacitance	$C_{ies}$	nF	-	87	-	$V_{CE}=10\text{V}$ , $V_{GE}=0\text{V}$ , $f=100\text{kHz}$ , $T_j=25^\circ\text{C}$	
Internal Gate Resistance	$R_{ge}$	$\Omega$	-	2.3	-	$V_{CE}=10\text{V}$ , $V_{GE}=0\text{V}$ , $f=100\text{kHz}$ , $T_j=25^\circ\text{C}$	
Switching Times	Rise Time	$t_r$	1.1	1.6	2.5	$V_{CC}=2,600\text{V}$ , $I_C=600\text{A}$	
	Turn On Time	$t_{on}$	1.5	2.2	3.0	$L=130\text{nH}$	
	Fall Time	$t_f$	1.6	1.9	3.0	$R_G=3.3\Omega$ (3)	
	Turn Off Time	$t_{off}$	3.1	3.6	5.5	$V_{GE}=\pm 15\text{V}$ , $T_j=125^\circ\text{C}$	
Peak Forward Voltage Drop	$V_{FM}$	V	3.7	4.2	5.0	$I_F=600\text{A}$ , $V_{GE}=0\text{V}$ , $T_j=125^\circ\text{C}$	
Reverse Recovery Time	$t_{rr}$	$\mu\text{s}$	0.3	0.6	1.0	$V_{CC}=2,600\text{V}$ , $I_F=600\text{A}$ , $L=130\text{nH}$ , $T_j=125^\circ\text{C}$	
Turn On Loss	$E_{on(10\%)}$	J/P	-	1.5	2.0	$V_{CC}=2,600\text{V}$ , $I_C=600\text{A}$ , $L=130\text{nH}$	
Turn Off Loss	$E_{off(10\%)}$	J/P	-	1.3	1.7	$R_G=3.3\Omega$ (3)	
Reverse Recovery Loss	$E_{rr(10\%)}$	J/P	-	0.7	1.0	$V_{GE}=\pm 15\text{V}$ , $T_j=125^\circ\text{C}$	
Thermal Impedance	IGBT	$R_{th(j-c)}$	K/W	-	-	0.013	Junction to case
	FWD	$R_{th(j-c)}$	K/W	-	-	0.026	
Contact Thermal Impedance		$R_{th(c-f)}$	K/W	-	0.008	-	Case to fin

Notes:(3)  $R_G$  value is the test condition's value for evaluation of the switching times, not recommended value.Please, determine the suitable  $R_G$  value after the measurement of switching waveforms (overshoot voltage, etc.) with appliance mounted.

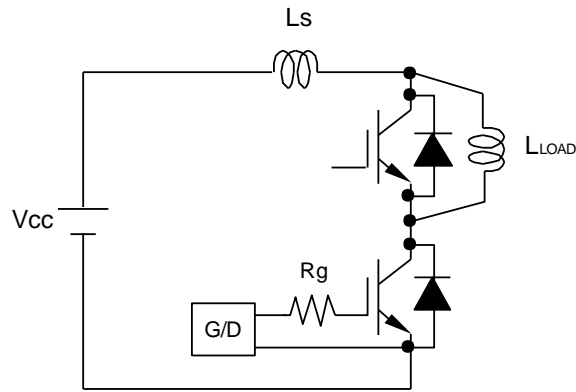
\* Please contact our representatives at order.

\* For improvement, specifications are subject to change without notice.

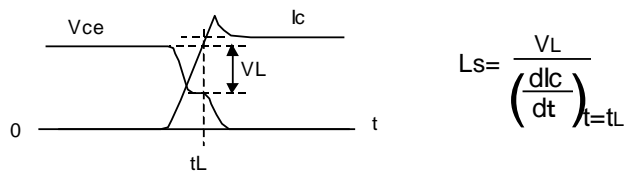
\* For actual application, please confirm this spec sheet is the newest revision.

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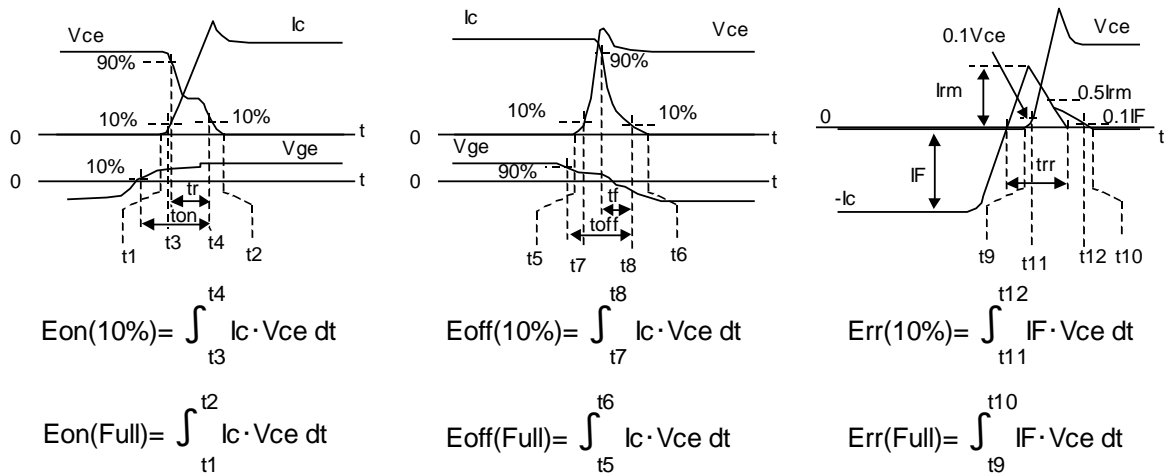
## DEFINITION OF TEST CIRCUIT



**Fig.1 Switching test circuit**



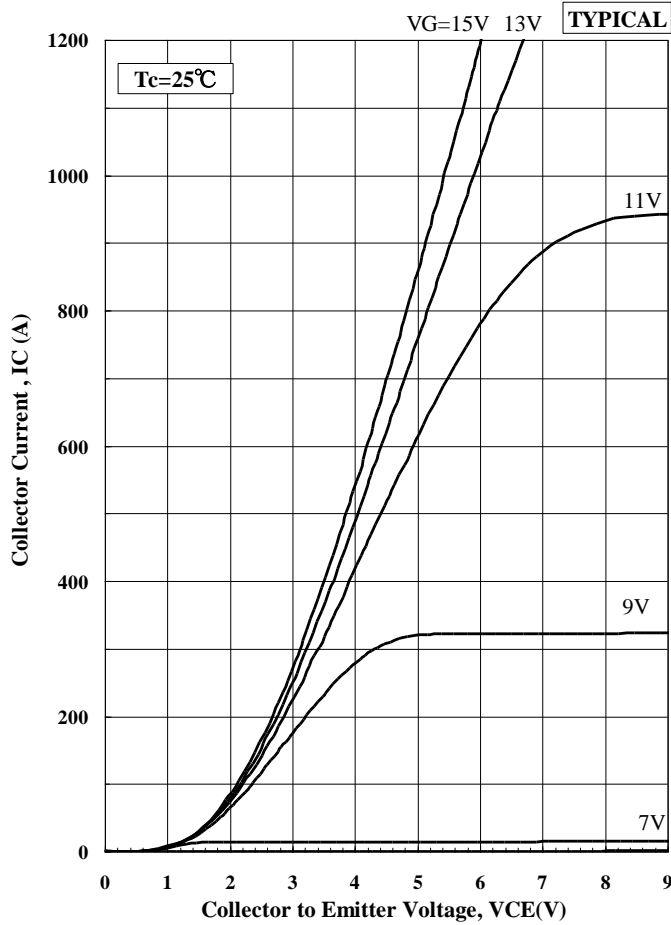
**Fig.2 Definition of Ls**



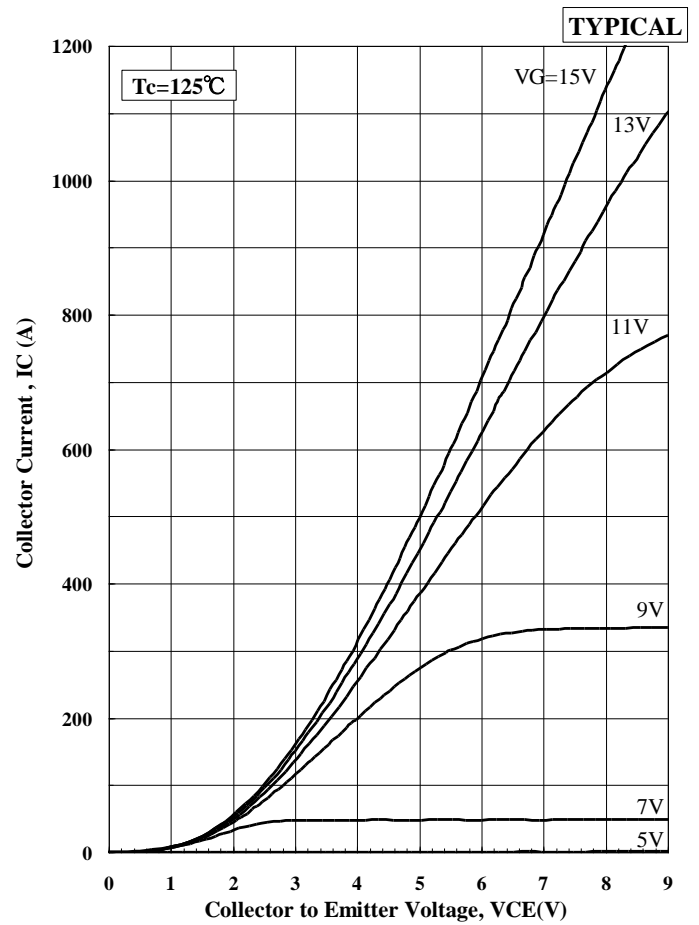
**Fig.3 Definition of switching loss**

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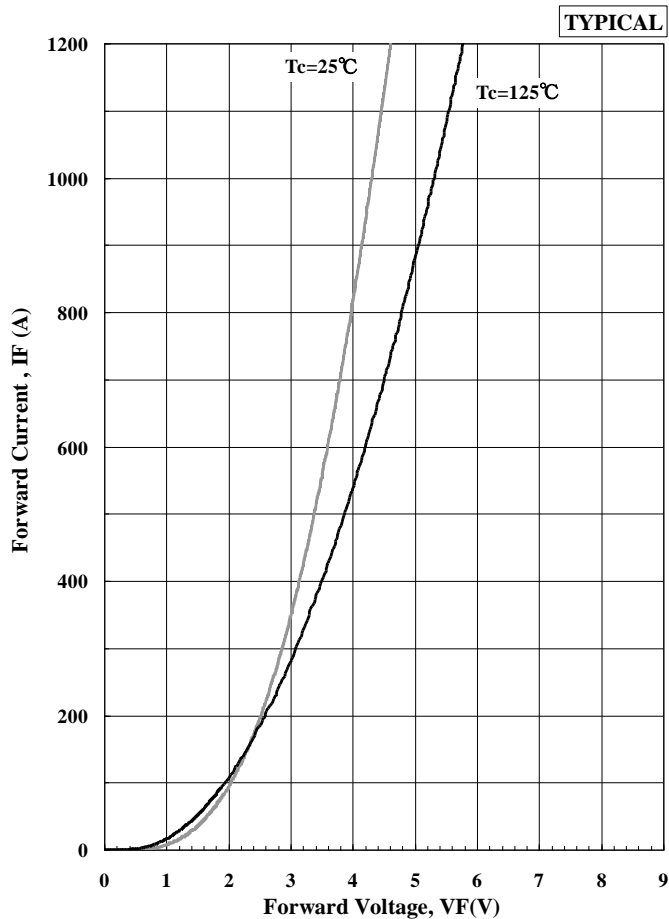
## CHARACTERISTICS CURVE



Collector Current vs. Collector to Emitter Voltage



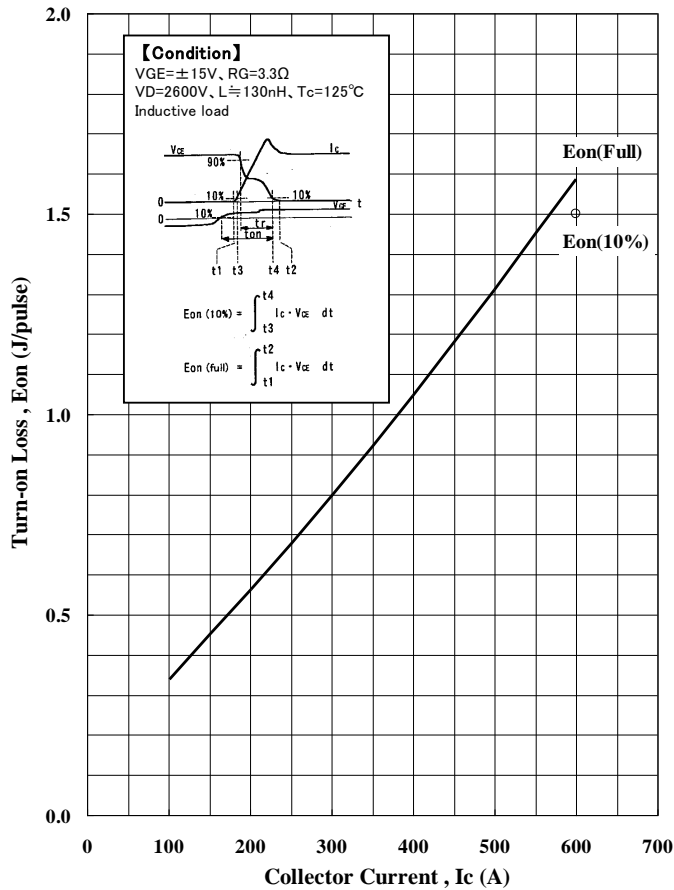
Collector Current vs. Collector to Emitter Voltage



Forward Voltage of free-wheeling diode

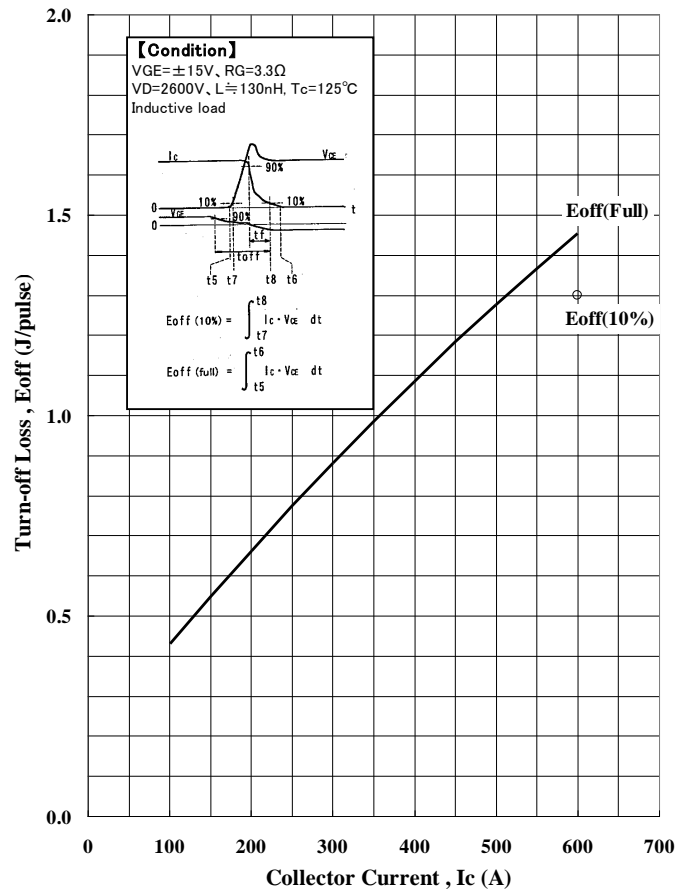
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TYPICAL



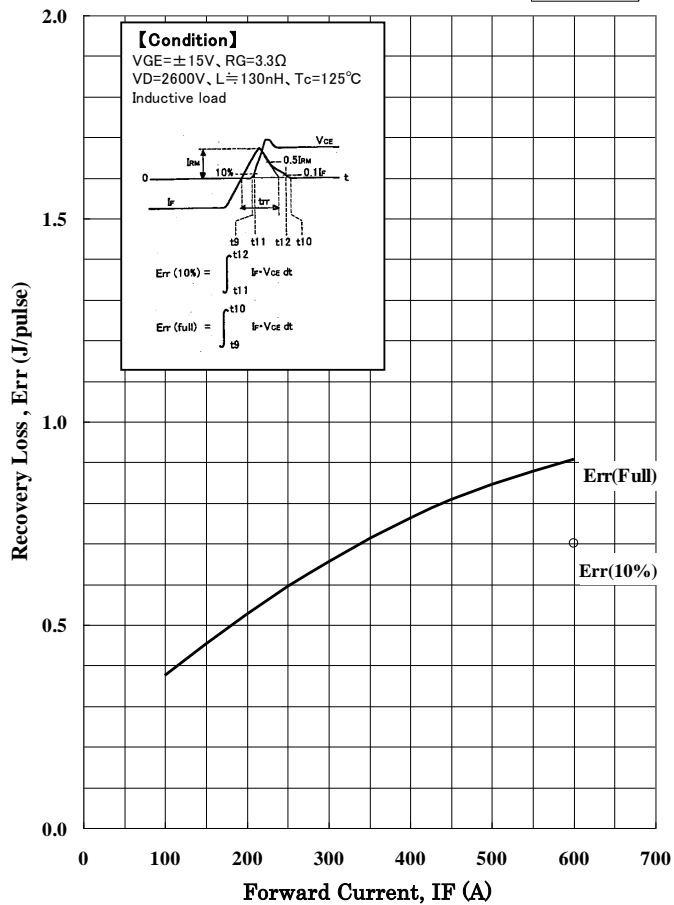
Turn-on Loss vs. Collector Current

TYPICAL



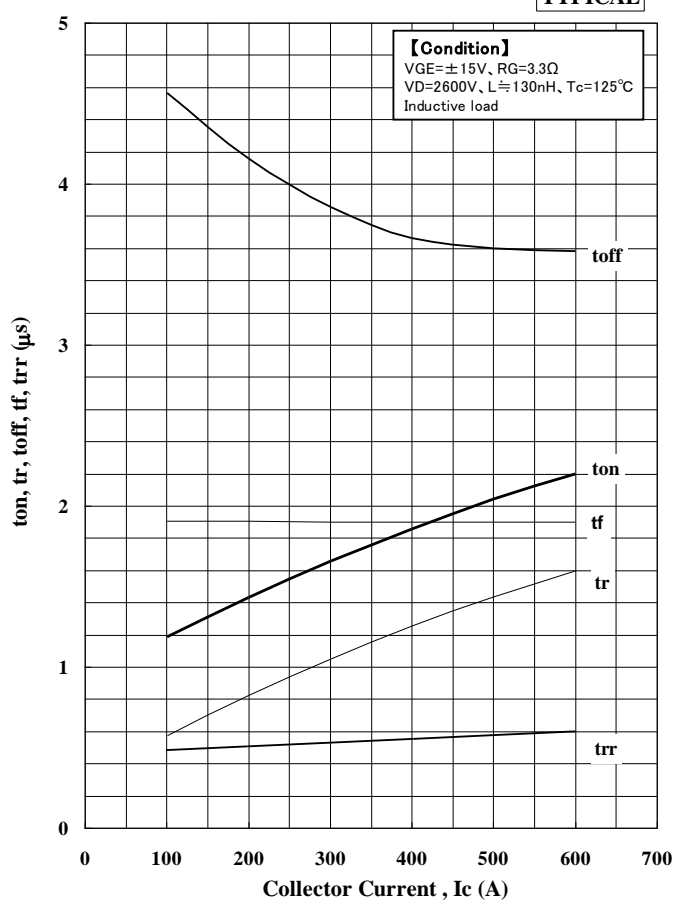
Turn-off Loss vs. Collector Current

TYPICAL



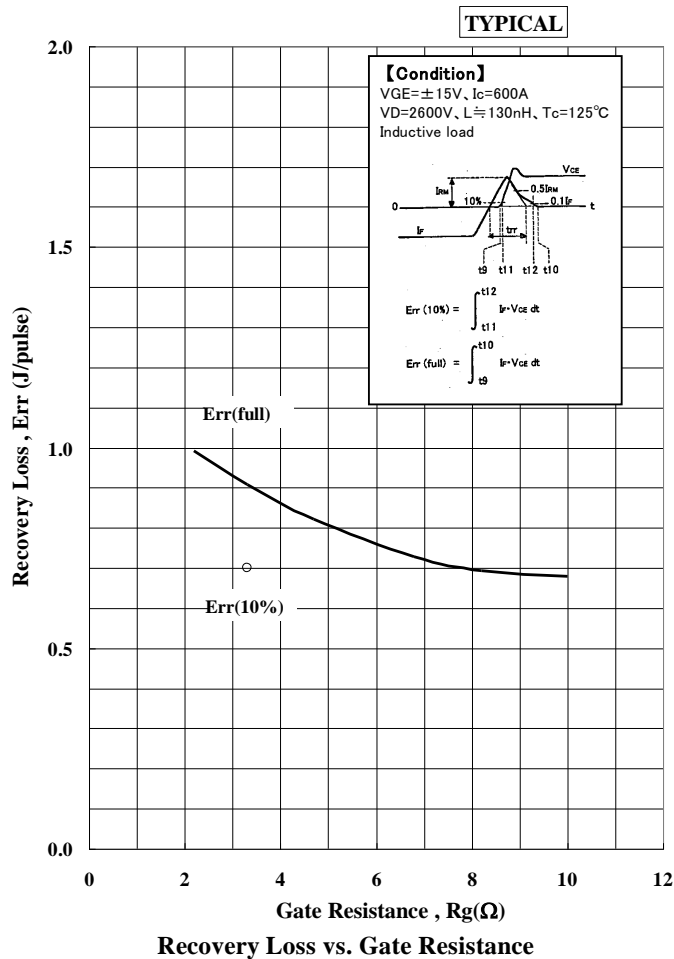
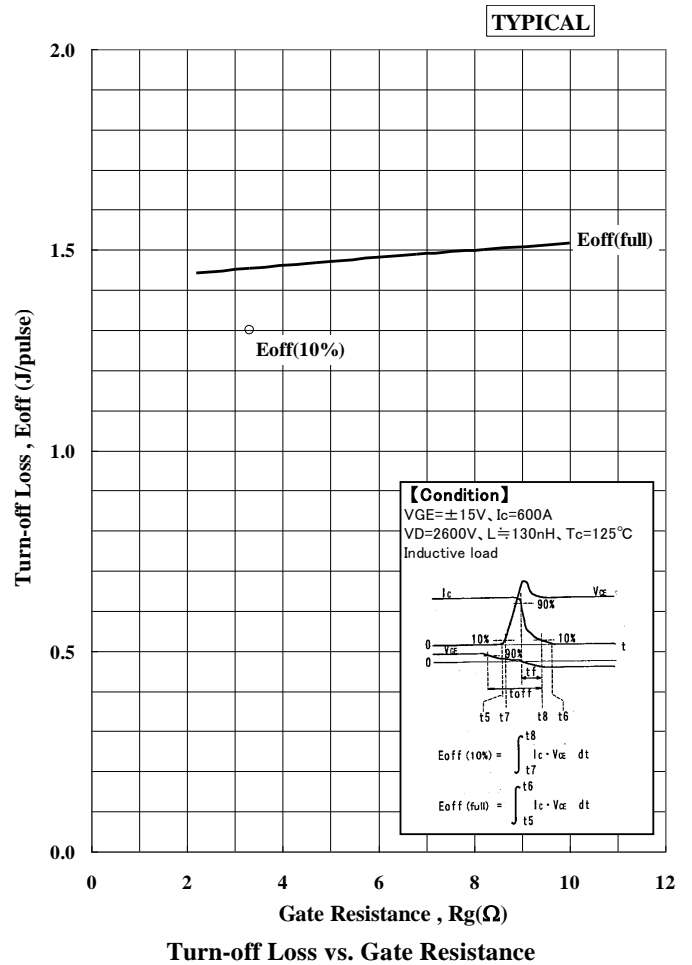
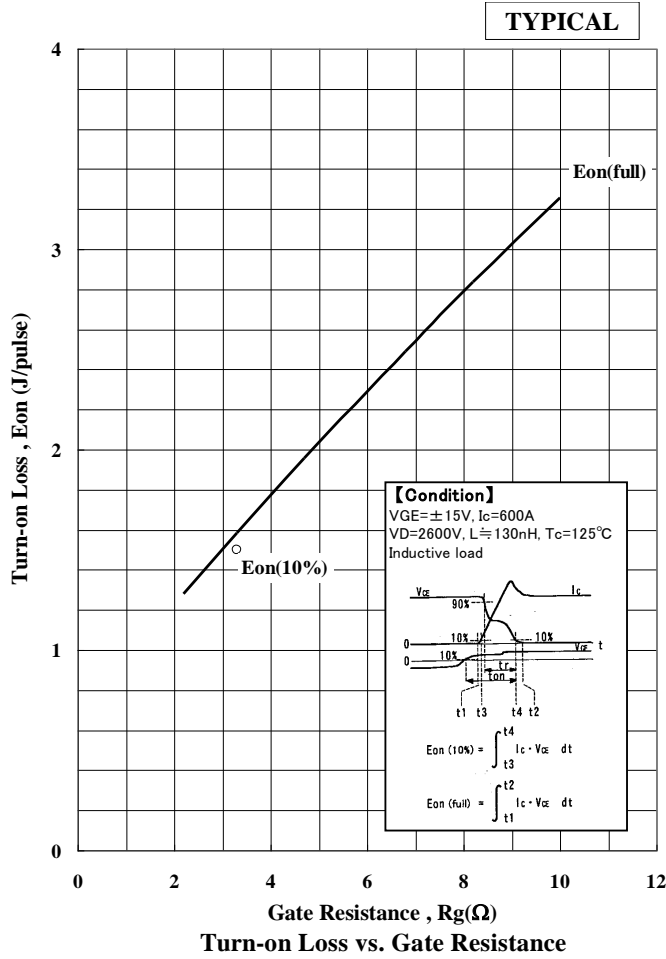
Recovery Loss vs. Collector Current

TYPICAL



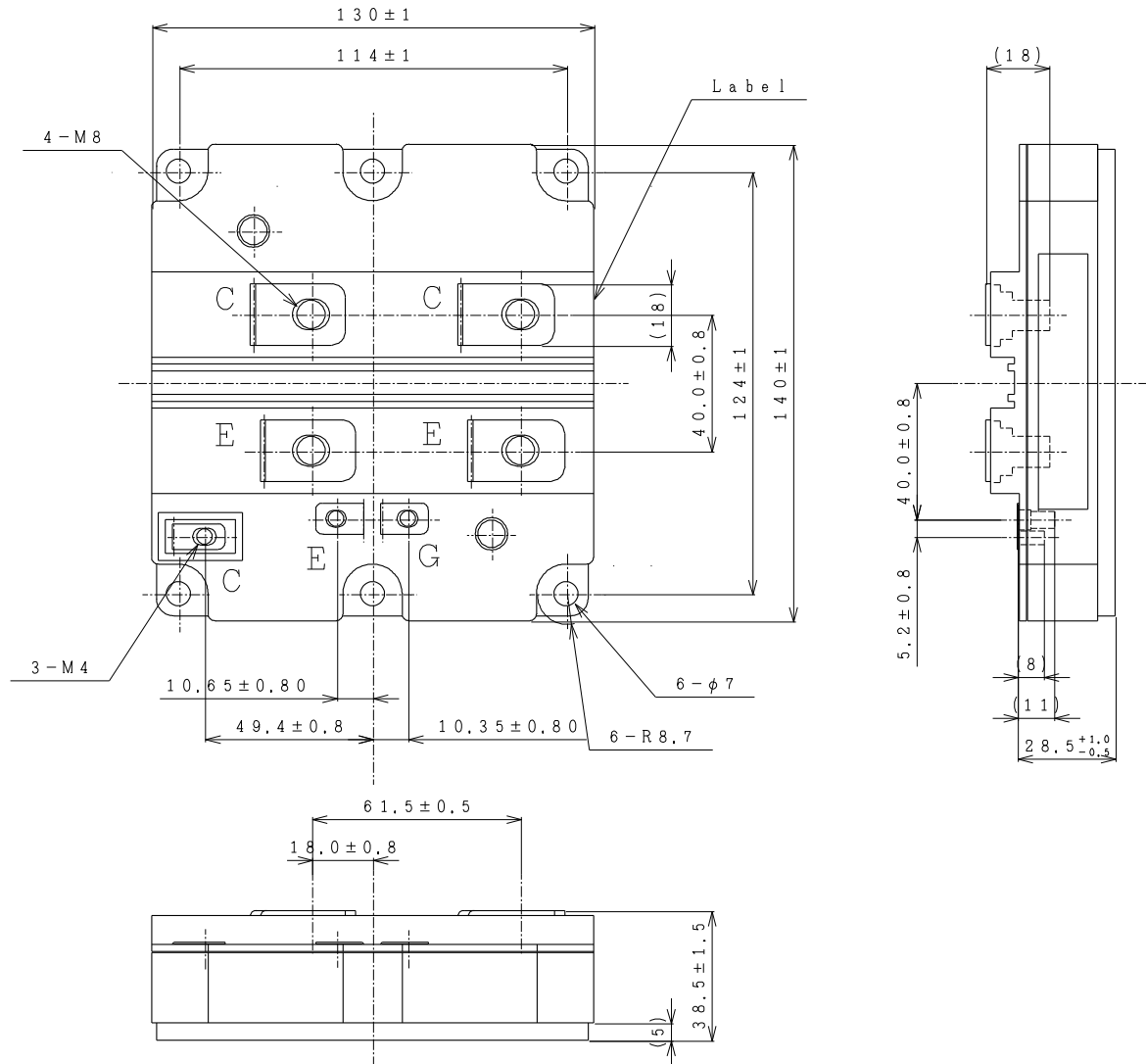
Switching time vs. Collector current

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## OUTLINE DRAWINGS



Unit in mm

Fig.4 Outline drawings

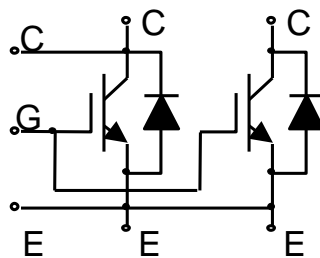
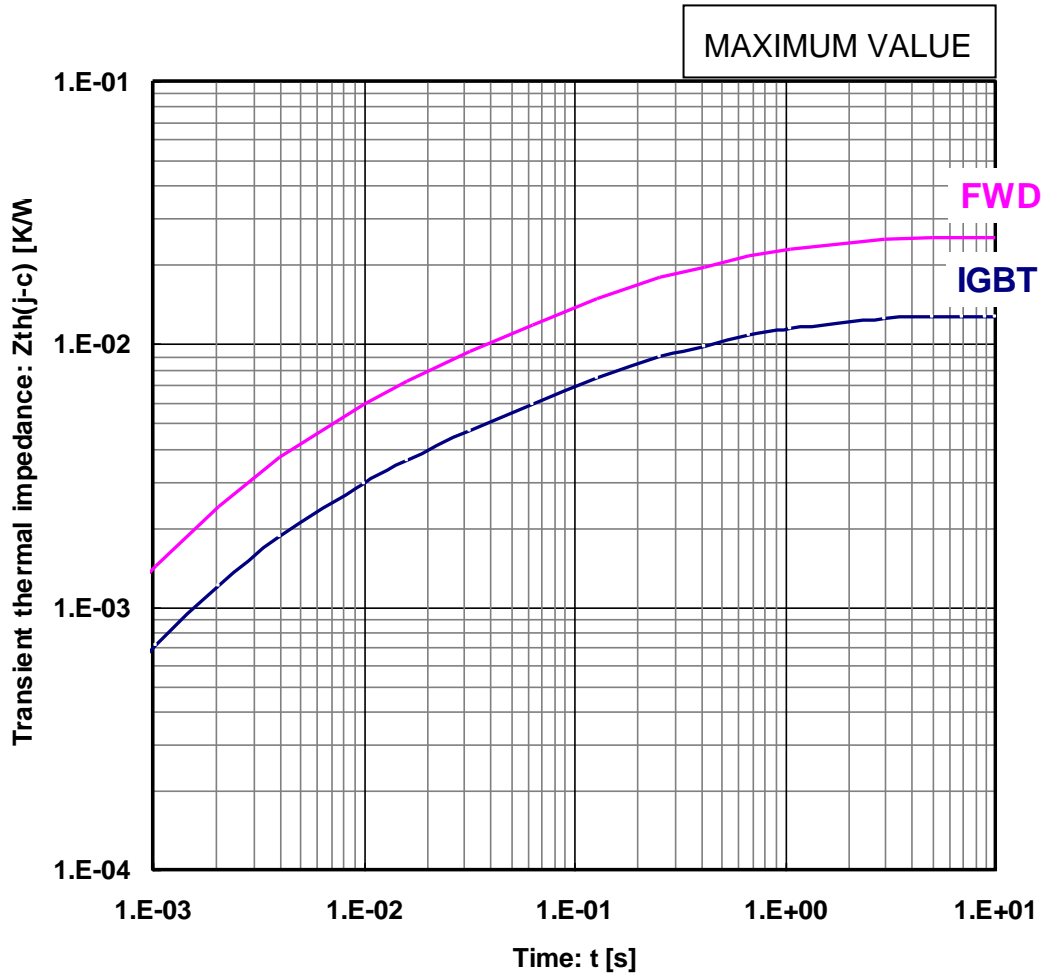


Fig.5 Circuit diagram

# MBN600E45A

## TRANSIENT THERMAL IMPEDANCE



### Material Declaration

Please note that following materials are contained in the product In order to keep characteristics and reliability level.

Material	Contained part
Lead (Pb) and its compounds	Solder

# MBN600E45A

## HITACHI POWER SEMICONDUCTORS

### Notices

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